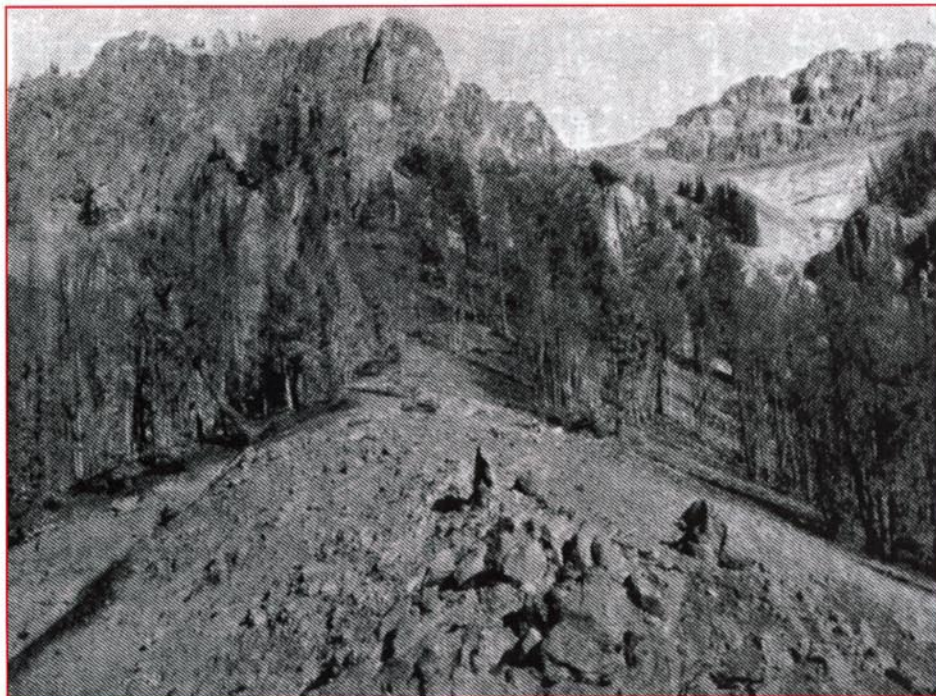


east, and then south, and then the west. It was the west fire that burned us. As the fire came closer to us we layed down on the rock ridge. Mr. Tyrrell layed on top of me. When the fire burned Mr. Tyrrell he ran and I ran, too, about 10 feet.

District Ranger Clayton, whose message Ranger Post received, died with six of his men. A seventh got out, but died from his burns. ■



When cut off from the safety sought above timber line (center background), Ranger Post and 40 men who followed his instructions survived by taking what shelter they could, first on the left (north) side, then the right side of the bare spot on the ridge (center foreground). Junior Forester Tyrrell died later from burns inflicted by the flames and heat that swept over them.

The Blowup Begins

The following eyewitness account describes the onset of the blowup on the Blackwater Fire on the afternoon of August 21, 1937. The blowup resulted from the passage of a dry cold front.*

Up until this time no wind was in evidence. Almost like a shot out of a gun, there was a heavy wind. It swept through the area in as near as I can determine in a northeasterly direction, this carried sparks over the constructed line and below us. I heard a fire roar to the northwest and it appeared to be a considerable distance away. I called to Tyrrell and told him that something was going wrong and that I was going to investigate.

I ran for some distance to the northwest and climbed a rocky point and saw below me a spot fire of considerable size burning to the northeast and around a ridge to the north of us. My impression was that this fire should be immediately taken care of and possibly abandon work on our line in order to do it.

I turned to summon help for this job when there was decided change in the wind again and the spot fire was swept into the southwest

directly into the line of men on line construction. In a few seconds numerous fires appeared below the line.... Almost at once it was clearly evident that further attempts at line construction in that area was out of the question. I sent out a call for all men to abandon their work and proceed to the ridge to the northeast. This was approximately three o'clock, P.M.

U.J. Post, District Forest Ranger
August 27, 1937

* Excerpt from "Statement by Ranger Urban J. Post," *Fire Control Notes* 1(5) [20 September 1937]: 308-315. Photos taken of the blowup can be found in E. Kauffman, "Death in Blackwater Canyon," *American Forests* 43(11) [November 1937]: 534-540.

THE FACTORS AND CIRCUMSTANCES THAT LED TO THE BLACKWATER FIRE TRAGEDY*



A.A. Brown

Original editor's note: Included as a vital part of the full report on the Blackwater Fire was the report made by A.A. Brown after an exhaustive study of the fire behavior and the critical circumstances which converged to bring about the tragedy. Mr. Brown had been only recently transferred to Region 2 to head the fire control work of that Region, and he brought to the tasks involved in this disaster the sound knowledge and discernment springing from long and successful fire experience.

Four Critical Factors

While no proof is available, the nature and circumstances of the blow-up on August 21 seem to indicate that an undiscovered spot fire, probably from the night before, to the north of Clayton Gulch and over the small, sharp ridge in Clayton Creek (one-half mile [0.8 km] west and north of the point where the Clayton group was later found), was the first critical factor in making the trap in which the men were caught and burned to death on that day. Apparently this spot fire at first spread up the slope immediately above to the northeast. This is clearly indicated by the note Ranger Clayton sent to Ranger Post at the time the spot fire spread conspicuously just prior to the blow-up.

The second critical circumstance was the fact that the timber above the newly constructed line had not crowned out except for a small fringe along the south edge. The third critical circumstance was the fact that "spotting" from the fire of the previous day had given a

The nature and circumstances of the blow-up on August 21 indicate that there were four critical factors involved.

ragged edge to the burning area on the steep downhill side, with small spots below the general front. As a result the fire fighters found it expedient to connect the fire line below the hottest spots, leaving considerable unburned surface fuel inside the line at the lowest point.

The fourth critical element was the nature of the forest fuel in this drainage. It consisted of a very dense stagnated stand of Douglas fir with a varying mixture—5 to 15 per cent—of spruce and of alpine fir. A dense overhead canopy existed, with dead branches nearly to the ground, with many small, brushy, dead or nearly dead suppressed trees as an understory, a considerable volume of sound dead branches, logs and suppressed trees on the ground, and with varying amounts of moss throughout the canopy and on all the dead branches. In addition, slopes of 20 to 60 per cent prevailed.

These four factors set the stage for what happened.

Strong Wind

The relative humidity at 1 p.m. on August 21 was 6 per cent, with a temperature of 90 °F (32 °C) at the fire danger station at the Wapiti Civilian Conservation Corps (CCC) camp, two and one-half miles (4 km) away at 2,000 feet (610 m) lower elevation. At approximately 3:30 p.m., with these critical circumstances prevailing, a strong gusty wind of apparently at least 30 miles' velocity per hour (48 km/h) came up from the southwest. About 3:45 p.m. it swerved and became a west wind. (These times are based on the circumstantial evidence of other events of the fire.)

The duration of this strong velocity is uncertain because of the strong convectional winds set up almost at once by the crowning. It is reasonable to suppose that the change in direction may have been largely a convectional effect. At the start, timber began to crown above the line and the whole fire there began to pick up in intensity and to throw new spots below the line, as might be expected. Possibly this

When this article was originally published, A.A. Brown was head of Fire Control for the USDA Forest Service, Rocky Mountain Region.

* The article is reprinted from *Fire Control Notes* 1(6) [December 6, 1937]: 384-387.

exerted a strong convectional pull on the spot fire below, which had also begun to crown.

At any rate, the course of the drive from the spot fire changed to the east and started directly up the drainage. The two crown fires then rapidly closed together with the cyclonic effect of such a circumstance, which reached its climax at 4:20 p.m. As a result, the major portion of the head of the Clayton Creek drainage from the spot fire up to Double Mountain was swept clean in a final crown fire conflagration which was completed by approximately 5 p.m.

In this conflagration 9 deaths occurred directly. Six additional men were so badly burned that death ensued, and 36 additional men suffered injuries from which they are recovering.

Firefighter Movements*

Just before the crowning started, the distribution of men on the newly constructed line in Clayton Creek had been as follows: Five men of the National Park Service crew on mop-up were operating as far as the first small park, about 5 chains (330 feet [101 m]) northeast of the ridge. Beyond them for 30 chains (1,980 feet [603 m]) were 6 men of the BPR crew, who had been actively pushing the new line construction from this point on, and who had got as far as Clayton Gulch, plus a few men who had been dropped off from Post's crew. Beyond them were Ranger Post, with Foremen Tyrrell and Saban and sub-foreman Hale, with about 40 men who had taken up the new line at Clayton Gulch and had completed 16 chains (1,056 feet

The two crown fires then rapidly closed together with the cyclonic effect of such a circumstance, sweeping clean the major portion of the head of the Clayton Creek drainage.

[322 m]) at the time the blow-up occurred.

Clayton, who had been placed in charge as sector boss of the new construction, was following the fresh crew in and checking up on conditions as he went. Apparently he was checking particularly on spot fires. The BPR crew were giving most of their attention to spot fires at two points below the 30 chains (1,980 feet [603 m]) of line they had constructed. They were about 20 chains (1,320 feet [402 m]) in from Trail Ridge, except for Pierce, one of their members who had been left alone on hot line at a point about 10 chains (660 feet [201 m]) in, where several logs were on fire close to the fire trench. Two men were left to help him as Post's crew came past and about 6 men were left with Saban and Clayton to work on spot fires.

By the time this distribution was completed, about 3:45 p.m., Post, Clayton, and Fifield, probably simultaneously, saw evidence of an uncontrolled spot fire. Fifield, according to his statement, was on the rock point of Trail Ridge at the time and thought at first that it was the spot near the bottom of the first gulch which had previously been found and trenched, but discovered instead that it was in line with it, but over the small ridge just to the north. He at once gave thought to Wolcott's crew, who were in this vicinity, but found them coming out on account of the crowning there. Wolcott immediately went on up

Trail Ridge and also called out the men from the fire trail north of Trail Ridge. Pierce, who had been near the highest point of the fire trail before it dipped down into Clayton Gulch, had already come out to the first small park with the two CCC boys helping him because of a flash of crowning just below him, which apparently crossed the fire line but died down again at the little park. He attempted to get the attention of the rest of the BPR crew, but, receiving no answer, decided they were withdrawing the other way.

About 6 other CCC boys were also assembled at the park, and all came out together at Wolcott's alarm call. The heavy crowning apparently occurred shortly afterward (about 4 p.m.). Post's attention was attracted to the spot fire when it started crowning toward the northeast up the slope on the north side of Clayton Creek. His first thought was to take his crew to it, but the wind changed and the fire started up the gulch before he could take any action to that end. Accordingly he started moving his crew from its path as best he could, as described in his statement.

Death Trap

Clayton's movements are not so clear in detail. It is evident from the note he dispatched to Post that the spot fire had attracted his attention, apparently from on the spur ridge just south of the gulch, where he was later trapped. Up to the time this fire started directly up the gulch it was a threat to the

*See the maps on page 14 (from the article by D.P. Godwin referenced in the sidebar on page 13).

With the direction of the fire's path directly up the gulch, it probably acted as a furnace draft and became a death trap.

line above which [it] must be stopped, but probably did not appear to be dangerous to life. Clayton saw it was the focal point if the line were to be held, and that more men than the 7 with him would be required.

It does not seem likely that he waited on the ridge above Clayton Gulch the 20 minutes or more that seems to have elapsed from the first active spreading of the spot fire below until the general blow-up occurred. Probably he started down toward it, either with his group or alone. If alone, he probably left instructions for his group to await his investigation of potentialities below. Or, if he took his group, he probably left one or more men at the spring in the gulch to await reinforcements from Post. In either case, the natural route of travel toward the spot fire would be down the gulch toward it.

Once off the ridge the full potentialities of the fire below would not have been immediately as evident to him as it was to Post above. Presumably, as soon as he saw what was about to happen, he turned back to get the men at the spring. In doing so he had to go back up the slope ahead of the fire and probably got to his men just at the time that every avenue of escape was cut off. Had the fire been going across topography the bare gulch might have served satisfactorily as a refuge. With the direction of its path directly up the gulch, it probably acted as a furnace draft and became a death trap.

Reconstructed Tragedy

In conclusion, the reconstructed tragedy depended on each of the four factors first discussed which contributed to the behavior of the fire, plus the distribution and movement of the men at the time. The high wind and burning condi-

tions alone, without the spot fire, would have created a dangerous situation, and would have no doubt forced abandonment of the newly constructed fire line, but without loss of life, since distances to safety were not great. Exactly the same strategy employed would likely have succeeded without incident a few hours earlier, or perhaps even at that time of day if no sudden change in wind velocity or direction had occurred.

Had the spot fire not been in line with one already controlled, or had not been hidden by the sharp little ridge in the bottom of Clayton Creek, it would have had earlier attention from the Park crew from Trail Ridge, and again the situation would have been changed.

More time on the part of either Clayton or Post to fully scout out the potentialities of the fire ahead of the crews might have prevented the tragedy.

Earlier arrival of the new crew, even by as little as a half hour, would have resulted in completing the new line and would have concentrated the attention of all supervising officers and man-power on all threats to holding it. This would have resulted in a different distribution of the crews and probably slight danger. Many other premises may also be drawn, but the matter of timing of action of the fire vs. movement of men gave the distinctive and fatal combination. ■

Other Articles on the Blackwater Fire

Godwin, D.P. 1937. The handling of the Blackwater Fire. *Fire Control Notes*. 1(6) [6 December 1937]: 373-383.

Brauneis, K. 2002. 1937 Blackwater Fire investigation: Boost for smokejumpers? *Fire Management Today*. 62(2): 24-26.